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Type Approval Certificate of Ballast Water Management System

This is to certify that the Ballast Water Management System listed below has been examined and tested in accordance with the requirements of the specifications contained in the Guidelines contained in IMO resolution MEPC 174(58). This certificate is valid only for Ballast Water Management system referred to below.

This certificate is issued to **Producer** **Address**	Coldharbour Marine Ltd. Baxter House Robey Close Linby Nottinghamshire NG15 8AA United Kingdom
Ballast Water Management System supplied:	Coldharbour Marine Ltd.
Under type and model designation and incorporating:	Coldharbour GLD Ballast Water Treatment System, Incorporating types SeaGuardian IGG500 to IGG6000
Ballast Water Management System Limiting conditions:	Tank configuration , Salinity range and other conditions, *see page 8,9*
To equipment/assembly drawing No:	22495 Rev 2 **Date:** 03 February 2015
Treatment Rated Capacity:	Minimum 20,000m3 total ballast water capacity Maximum based on a 6000m3/hr IGG 5 day ballast journey – 57,600m3 total ballast water capacity 10 day ballast journey – 345,600m3 total ballast water capacity

A copy of this Type Approval Certificate should be carried on board a vessel fitted with this Ballast Water Management System at all times. A reference to the test protocol and a copy of the test results should be available for inspection on board the vessel. If the Type Approval Certificate is issued based on approval by another Administration, reference to that Type Approval Certificate shall be made.

Limiting Conditions imposed as described in the Design Appraisal Document forms part of this certificate.
This certificate remains valid up to the expiry dated unless cancelled or revoked, or until such date where it is superseded by the requirements of the Marine Equipment Directive whichever is the earlier, provided the conditions in the attached schedule are complied with and the equipment remains satisfactory in service.

Date of issue 06 February 2015

Certificate No. MCA 1500002

Sheet No 1 of 9

Expiry date 05 February 2017

Lloyd's Register

MTES Southampton Office
Signed

Lloyd's Register EMEA

LR031.1.2013.12

Name S . Abeysekara
Surveyor to Lloyd's Register EMEA
is a subsidiary of the Lloyd's Register Group

Note:
This certificate is not valid for equipment, the design or manufacture of which has been varied or modified from the specimen tested. The manufacturer should notify the nominated body named on this certificate of any modification or changes to the equipment in order to obtain a valid Certificate.

Maritime & Coastguard Agency

Notified Body authorised by the MCA

This certificate is issued under the authority given in Merchant Shipping Notice No MSN 1735 (M+F) as amended to date.

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DESIGN APPRAISAL DOCUMENT

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ATTACHMENT TO CERTIFICATE OF TYPE APPROVAL No. MCA 1500002

The undernoted documents have been appraised for compliance with the relevant International Conventions and UK legislation for the Type Approval of Marine Equipment for use on Merchant Ships Registered in the United Kingdom.

This Design Appraisal Document forms part of the Certificate that is issued under the authority given in the MCA Merchant Shipping Notice No MSN 1735.

APPROVED RATINGS IN CERTIFICATE NO. MCA 1500002

Equipment : Gas Lift Diffuser (GLD)
Manufacturer : Coldharbour Marine

GLD Model	Gas Flow per GLD (m^3/hr)
GLD100	15-60
GLD150	75-120
GLD200	135-195
GLD250	210-270
GLD300	285-345

Equipment : SeaGuardian Innert Gas Generator (IGG)
Manufacturer : Coldharbour Marine

IGG Model	Gas Flow (m^3/hr)
IGG500	250-500
IGG1000	500-1000
IGG1500	750-1500
IGG2000	1000-2000
IGG3000	1500-3000
IGG4000	2000-4000
IGG5000	2500-5000
IGG6000	3000-6000

Equipment : Gas Cooling Tower (GCT)
Manufacturer : Coldharbour Marine

GCT Size	Gas Flow (m^3/hr)
GCT500	500
GCT1000	1000
GCT1500	1500
GCT2000	2000
GCT3000	3000
GCT4000	4000
GCT5000	5000
GCT6000	6000

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Equipment : Pressure Vacuum Breaker (PVB)
Manufacturer : Coldharbour Marine

PVB Model	**Gas Flow (m^3/hr)**
PVB 500-6000	From 500 up to 6000

Equipment : High Velocity valve (HV)
Manufacturer : Pres-Vac engineering A/S, Denmark

HV Model	**Operating range**
HSL	Pressure 500 (mm WG) Vacuum 350 (mm WG)

Equipment : IG Compressor
Manufacturer : Ingersoll Rand Air solutions, France

IG comp Model	**Gas Flow (m^3/hr)**
CD42S	4809 m^3/hr

Equipment : Control & Monitoring system (C&M)
Manufacturer : Coldharbour Marine

Control System	**Incorporating**
Inert Gas System Control	MCCC Panel, IGG Control Panel, Valve Island Panel

The control panels listed above are standard across the range listed under the IGG section (with the exception of the VSD in the MCCC panel)

BWT System	BWT, Remote I/O, Barrier, Tank Instrument, Cargo Control Room, Bridge HMI Panels

The control panels listed above are standard in terms of the items included however the number of Remote I/O and Tank Instrument panels varies in accordance with the individual vessel layout.

Electrical and Control Equipment

BWTS control panel components:

- PLC, Siemens 6ES7314-6EH04-0AB0
- PLC I/O, Siemens 6ES7323-1BL00-0AA0
- PLC I/O, Siemens 6ES7331-7KF02-0AB0
- PLC I/O, Siemens 6ES7332-5HB01-0AB0
- PLC I/O, Siemens 6EP1334-3BA00
- RS485-IS coupler/ Profibus connector, Siemens 6ES7972-0AC80-0XA0
- Circuit Breaker CB1-5, Siemens 5SY4xxx
- Circuit Breaker CB6, Siemens 5SY4101-7

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BWTS Splitter barrier control panel:

- Signal Barrier T1-T2, MTL 4510

BWTS Remote I/O panel:

- PLC Terminal module, Siemens 6ES7193-7DA00-0AA0
- PLC Terminal block, Siemens 6ES7193-7AA00-0AA0
- PLC interface module, Siemens 6ES7138-7EA01-0AA0
- PLC interface module, Siemens 6ES7152-1AA00-0AB0
- PLC I/O, Siemens 6ES7131-7RF00-0AB0
- PLC I/O, Siemens 6ES7134-7TD50-0AB0
- PLC I/O, Siemens 6ES7134-7TD00-0AB0

BWTS In tank instrument control panel:

- Pressure transmitter, Siemens 7MF1566-3AC011AA1

BWTS field instruments:

- Pressure transmitter, Siemens 7MF1566
- Flow transmitter, Endress & Hauser Proline Prowirl 72W
- Hydrocarbon display, Draeger Polytron 8700
- Hydrocarbon transmitter, Draeger PIR 7000

BWTS Remote control panel equipment:

- HMI, Siemens 6AV2124-0MC01-0AX0
- Circuit breaker, Siemens 5SY420x-7
- Power supply PS1, Siemens 6EP1332-2BA10
- HMI, Siemens 6AV2124-2DC01-0AX0

Motor control centre panel components:

- Variable Speed Drive, ABB ACS800-01-0105-5
- Main Isolator, ABB 1SCA022710R0100
- Circuit Breaker CB1, Siemens 5SY4302-5
- Circuit Breaker CB2 Siemens 5SY4363-8
- Circuit Breaker CB3, Siemens 3VL2716-1DK33-0AA0
- Circuit Breaker CB4-11, Siemens 5SY4210-7
- Motor Circuit Breaker Q1-3, Siemens 3RV20110KA10
- Motor Line Contactor K1-3, Siemens 3RT20151BB41

Inert gas generator components:

- HMI, Siemens 6AV2124-0MC01-0AX0
- PLC CPU, Siemens 6ES7214-1HG40-0XB0
- PLC I/O, Siemens 6ES7221-1BF32-0XB0
- PLC I/O, Siemens 6ES7231-4HF32-0XB0
- PLC I/O, Siemens 6ES7232-4HD32-0XB0

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- PLC I/O, Siemens 6ES7223-1PL32-0XB0
- PLC I/O, Siemens 6ES7234-4HE32-0XB0
- Power supply PS1, Siemens 6EP1334-3BA00
- Power Supply PS2, Siemens 6EP1332-5BA10
- Power Supply PS3, Siemens 6EP1332-1SH71
- Main Isolator S1, Siemens 3LD2003-0TK51
- Circuit Breaker CB1-4, Siemens 5SY4xxx
- Circuit Breaker CB2 Siemens 5SY4363-8
- Circuit Breaker CB5, Siemens 5SY4101-7
- Circuit Breaker CB6-12, Siemens 5SY4xxx
- Circuit Breaker CB13-16, Siemens 5SY4101-7
- Temperature Switch TS006, Trafag Navistat 471.23
- Oxygen analyser E600, Green Instruments G36
- Soot Monitor E700, Green Instruments G1000
- Oxygen analyser E600, Green Instruments G36

Operational Requirements

Treatment

Ballast tanks will be grouped according to the treatment regime required by the minimum ballast leg journey. Each group will be treated sequentially or concurrently, with indication on successful completion of each phase.

Phase 1 – Dwell (minimum 24 hrs)
Phase 2 – De-aeration (minimum 12 hrs)
Phase 3 – Dwell/Hold (minimum 60 hrs)
Phase 4 – Re-aeration (minimum 12 hrs)
Phase 5 – Post Dwell (minimum 12 hrs)

Please refer to the ship specific information matrix.

Performance Requirements

Maximum IG Oxygen content: 0.02%
Minimum IG pressure to Ultra-Sonic Device: 3.5 bar
Minimum pH level: < 5.7
Maximum Dissolve Oxygen: 0.6 mg/l
Minimum effective holding time: 05 days

Land Based test report

Verification report landbased tests, Ballast water management system, CHM Ltd, Rev 1.1, April 2014

Ship board test report

Report of the shipboard verification test of the BWMS of CHM Ltd, Doc no SB-1401, Rev 1, Dec 2014

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APPROVAL DOCUMENTATION

Request form	28 January 2011
Request form	16 January 2015
Plant summary, H&S overview and COSHH, Doc. no CHM-14-009, Rev 3	04 Feb 2015
Operational description and control philosophy, Doc. no CHM-14-014, Rev 3	04 Feb 2015
BWTS Start-up, shut down, fault finding & maintenance, Doc. no CHM-14-029, Rev0	20 Nov 2014
IGG system Start-up, shut down, fault finding & maintenance, Doc. no CHM-14-028, Rev0	18 Nov 2014
Typical supplier's literature, O & M manuals, Doc no CHM-14-009, Rev 1	21 October 2014
Pressure Vacuum-Breaker general assembly, Doc no. PVB-22493, Rev 0	07 Nov 2014
3000m³/hr PV breaker general assembly Starboard, Doc no. PVB 21503, Rev 2	31 January 2012
3000m³/hr PV breaker main body assembly Port, Doc no. PVB 21504, Rev 2	31 January 2012
High velocity valve type HSL, Doc no. 2383-120159-0 , Rev1.5	03 Feb 2012
Drawings and Schedule, Doc no. CHM-14-022, Rev 01	15 October 2014
BWT sample pipe arrangement template,	23 Nov 2012
Typical combined IGS & BWT process, Doc no. 22495, Rev 2	03 Feb 2015
LR Type approval for Wavistrong GRE pipe system, Doc no 01/00177(E2)	22 Nov 2011
Control panels system overview, Doc no. E00033/2014, Rev. 0	21 Nov 2014
Cargo control room HMI, Doc no. E00026/2014, Rev. 0	21 Nov 2014
Bridge HMI control panel, Doc no. E00030/2014 , Rev. 0	21 Nov 2014
Electrical control panels and their power supply, E00038/2014, Rev. 0	20 Nov 2014
Control panels system overview , Doc no. E00039/2014, Rev. 0	20 Nov 2014
Ballast water treatment control panel, E00025/2014, Rev. 0	20 Nov 2014
Splitter barrier control panel, E00029/2014, Rev. 0	20 Nov 2014
Remote I/O control panel (one tank), E00027/2014, Rev. 0	20 Nov 2014
Port tank instrument control panel, Doc no. E00028/2014, Rev. 0	20 Nov 2014
Demonstration procedure via BWTS automation rig, CHM-15-006, Rev. 0	27 January 2015
Ballast water treatment system PLC alarms, CHM-14-026, Rev. 0	27 Nov 2014
Ballast water treatment system PLC I/O list report, CHM-14-024, Rev. 0	20 Nov 2014
BWTS operational description and control philosophy, CHM-14-014, Rev. 0	15 October 2014

TEST REPORTS

Testing on international paint coating schemes in Coldharbour BWTS	August 2011
Testing of 2x Balloxy HB light and 2x Jotacote universal exposed to inert gas in natural water, Doc no. 01.170311	19 Nov 2011
Report of the shipboard verification test of the BWMS of CHM Ltd, Doc no SB-1401, Rev 1	Dec 2014
Verification report landbased tests, Ballast water management system, CHM Ltd, Rev 1.1	April 2014
Extended test report of the Ballast Water Management System of CHM	Nov 2013
BWTS test schedule report	04 Feb 2015
Coldharbour marine email 'Alarms and Acknowledgement' confirming control system functions	04 Feb 2015

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SUPPORTING DOCUMENTS

PVB 3000 Design calculations, Doc no CHM-14-031		
IGG Automation project, RA terms of reference, Doc no.CHM-14-037	18 Nov	2014
BWTS Hazard and Operable Study, Doc no.CHM-14-036	17 October	2014
IGG Automation project, HAZOP terms of reference, Doc no.CHM-14-013	26 August	2014
Role and fate of bacteria in ballast water management technologies, Doc R-1501	Jan	2015
Review report on the roles and fate of bacteria in BWMS developed by MEA-nl	03 Feb	2015
PML application CHM approval test data, summary of findings	28 Jan	2015
EC - Type examination certificate SEV1OATEX0146	14 Dec	2010
ATEX certificate MTL08ATEX4510X issue 2	03 Apr	2014
EC - type examination certificate KEMA 02ATEX1289 issue 4	undated	
EC - type examination certificate KEMA 04ATEX2242 issue 7	undated	
EC - type examination certificate KEMA 09ATEX0178X issue 3	undated	
EC - type examination certificate KEMA 06ATEX0274X issue 3	undated	
IECEX certificate of conformity IECEX BAS 06.0057 issue 1	20 Nov	2008
EC - type examination certificate PTB 07 ATEX 1016 0	July	2007
EC - type examination certificate PTB 07 ATEX 1019	11 May	2007
EC - type examination certificate DEMKO 07 ATEX 0654417X rev. 1	16 Nov	2011
GL type approval certificate 26 905-05 HH	26 Jan	2012
DNV type approval certificate A-12573	07 Dec	2011
DNV type approval certificate A-13628	21 Jan	2014
DNV type approval certificate A-12553	22 Jun	2012
Supplement to EC - type examination certificate BVS 05 ATEX E 172 X	undated	
Supplement to EC - type examination certificate BVS 04 ATEX E 121 X	17 Dec	2010
GL type approval certificate 15 525-00 HH	13 Oct	2010
LR type approval certificate 98/20060(E9)	11 Jun	2013
LR type approval certificate 98/20056(E10)	14 Feb	2014
DNV-GL type approval certificate 20 491-11 HH	13 Jun	2014
LR type approval certificate 10/00035	28 May	2010
LR type approval certificate 04/20022(E2)	15 Dec	2014
LR type approval certificate 01/20041(E2)	21 Jun	2012
LR type approval certificate 03/20081(E6)	04 Jun	2013
DNV type approval certificate A-11897	26 Sep	2012
DNV type approval certificate A-12027	20 Nov	2012
DNV type approval certificate A-12344	20 Jun	2013
DNV type approval certificate A-11749	23 Apr	2010
DNV type approval certificate A-13512	04 Nov	2013
DNV-GL type approval certificate 20 491 - 11 HH	13 Jun	2014
GL type approval certificate 47104-12 HH	18 Oct	2012
GL type approval certificate 11587-10 HH	09 Oct	2013
GL type approval certificate 15525-00 HH	13 Oct	2010
LR type approval certificate 01/20041(E2)	21 Jun	2012
LR type approval certificate 11/20009(E1)	04 Jun	2013
LR type approval certificate 11/20020	12 May	2011
LR type approval certificate 11/20012(E1)	24 Apr	2014
LR type approval certificate 09/70005(E1)	17 Dec	2013
LR type approval certificate 09/70007	21 Sep	2009

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CONDITION OF APPROVAL

Coldharbour Marine (CHM) is to issue a ship specific information and instruction matrix for each installation including but not limited to IG flow rate, Treatment sequence and treatment profile for the operational performance of the BWTS.

The BWTS is to be operated by trained personnel only. Manufacturer's instructions and common industry safety practises are expected to be followed. CHM is required to provide training to the satisfaction of the client.

Scrubber effluent and effluent from cooling water drain is to be disposed in according to the relevant national and international regulation.

Capacity of PV breaker inlet and position for installation is to be in accordance with relevant classification rules.

Details of the location of the Coldharbour Marine ballast water treatment system, and its connection into the ship's ballast system are to be shown on the ship's plans, which are to be submitted for approval.

Ballast water treatment system is to be installed and commission in accordance with the Section 8, Installation Survey and Commissions Procedures of MEPC 174(58) and relevant classification society rules and regulations.

Equipment installed in areas where an explosive gas atmosphere may be present, are to be of a type providing protection against ignition of the gases encountered and to be certified accordingly.

Electrical system components not listed above are not considered for environmental suitability as per MEPC.174(58) – Part 3.

It is concluded that the ballast water treatment system is to be used in conjunction with the inert gas generator and gas cooling tower arrangement as described in document CHM-14-014.

The Coldharbour GLD Ballast Water Treatment System is approved for double hulled vessels with a typically 'J' type Ballast tank configuration normally found on tankers, bulkers and LPG/LNG carriers.

The Coldharbour GLD Ballast Water Treatment System is approved for operation in brackish and marine waters only (Not tested for fresh water)

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CONDITIONS OF CERTIFICATION

Cold Harbour Marine (CHM) hereafter referred as licensee

1. Within five years, the licensee must submit a report to the United Kingdom's competent authority, the Maritime and Coastguard Agency (MCA), detailing all experiences with the operation of the ballast water system, including results and analysis of any scientific research relevant to the safe operation and environmental impact of the system.

2. Notwithstanding the requirement to report before the fifth anniversary of the date of the type approval certificate the licensee is required to comply with the following additional provisions:

   2.1 The licensee must report immediately all events to the MCA leading to harm either to human health or the environment as a result of the operation of the ballast water management system.

   2.2 Any indications that the ballast water management system is not performing to the standards of the ballast water convention must be reported to the MCA including any deficiencies identified by port State control.

   2.3 All accidents (e.g., accidental exposure to UV) in connection with the ballast water management system must be reported immediately to the MCA.

   2.4 Significant changes in the construction of the ballast water management system must be reported to both the MCA and the recognised organisation that issued the type approval certificate on behalf of the MCA; if they potentially affect the efficiency of the system, they must be approved by the MCA.

   2.5 The licensee must take reasonable measures to ensure that the operator of the system is trained & familiar with the operation of the system and is capable of operating and maintaining the system in accordance with the operating manual.

   2.6 If the licensee does not comply with these additional provisions, the type approval may be revoked by the MCA.

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LR031.1.2013.12

S. Abeysekara
Engineering Systems
Marine Technical & Engineering Services
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Part 10
Subject: Ballast Water Treatment Systems
Product: Ballast Water Treatment Systems

Producer	Product	Type and Details	Standard(s)	Remarks	Cert. No.
Coldharbour Marine Ltd **Baxter House** **Robey Close** **Linby** **Nottinghamshire** **NG15 8AA** **United Kingdom**	**Coldharbour GLD Ballast Water Treatment System**, Incorporating types SeaGaurdian IGG500 to IGG6000	Ballast water treatment system using Innert Gas with Ultrasonic and Microbuble generation (GLD unit) inaccordance with the requirements of IMO resolution MEPC.174(58) Max & Min TRC: Maximum based on a 6000m3/ hr IGG, 5 day ballast journey – 57,600m3 total ballast water capacity. 10 day ballast journey – 345,600m3 total ballast water capacity. Minimum 20,000m3 total ballast water capacity. Description: IGG model 500 to 6000, flow range of 250-6000 m^3/ hr. GLD model 100 to 300, flow range of of 15-345 m^3/ hr per GLD Maximum IG Oxygen content: 0.02% Minimum IG pressure to Ultra-Sonic Device: 3.5 bar Minimum pH level: < 5.7 Maximum Dissolve Oxygen: 0.6 mg/ l Minimum effective holding time: 05 days	Treatment of ship's ballast water in accordance with the requirements of IMO resolution MEPC.174(58)	Expires: 05 February 2017 Refer to certificate for Conditions of Approval	MCA 1500002